Lloyd's Register

Rules and Regulations for the Classification of Inland Waterways Ships, November 2008

Notice No. 7

Effective Date of Latest Amendments:

See page 1

Issue date: February 2011

RULES AND REGULATIONS FOR THE CLASSIFICATION OF INLAND WATERWAYS SHIPS,

November 2008

Notice No. 7

This Notice contains amendments within the following Sections of the *Rules and Regulations for the Classification of Inland Waterways Ships, November 2008.* The amendments are effective on the dates shown:

Part	***Chapter***	***Section***	***Effective date***
1	2	1	1 November 2010
1	2	2	1 November 2010
3	1	4	1 November 2010
3	3	4	1 November 2010
3	5	6	1 November 2010
3	6	4	1 November 2010
3	7	1, 2	1 November 2010
3	10	2	1 November 2010
3	12	5	1 November 2010
4	1	1, 5, 12	1 November 2010
4	2	3	1 November 2010
4	4	1	1 November 2010
4	5	1, 2, 6, 7, 8, 9	1 November 2010
4	6	1, 3, 5, 7, 10	1 November 2010
4	7	1	1 November 2010

The *Rules for Inland Waterways* are to be read in conjunction with this Notice No. 7.
The status of the Rules is now:

Rules for Inland Waterways	Effective date:	November 2008
Notice No. 1	Effective date:	1 March 2009
Notice No. 2	Effective date:	1 April 2009
Notice No. 3	Effective date:	1 July 2010 and Corrigendum
Notice No. 4	Effective date:	1 July 2010 and Corrigenda
Notice No. 5	Effective date:	1 March 2010 and Corrigenda
Notice No. 6	Effective date:	1 July 2010 and Corrigenda
Notice No. 7	Effective date	1 November 2010

Part 1, Chapter 2
Classification Regulations

Effective date 1 November 2010

■ *Section 1*
Conditions for classification

1.1 General

1.1.8 For ships, the arrangements and equipment of which are required to comply with the requirements of either the:

- European Agreement concerning the international carriage of dangerous goods by Inland Waterways (ADN); or
- ~~European Agreement concerning the international carriage of dangerous goods by inland waterways on the river Rhine (ADNR); or~~
- Règlement de visite des bateaux du Rhin 1995 (Rhine inspection regulations); or
- EC Directive (2006/87/EC) DIRECTIVE of the EUROPEAN PARLIAMENT and of the COUNCIL of 12 December 2006 laying down technical requirements for Inland Waterway vessels; or
- Any National regulations specified by the Government of the Flag State, and applicable Amendments thereto, the classification committee requires the applicable Certificates to be issued by a National Administration, or by LR, or by an IACS Member when so authorised.

■ *Section 2*
Character of classification and class notations

2.1 Definitions

2.1.10 **Dangerous Goods notation**. Double-hull dry cargo ships built in compliance with Chapter 9, Section 9.1.0.80 of the ADN ~~or ADNR~~ and complying with the additional requirements of Pt 4, Ch 1,12 will be eligible to be classed:

'**DG**'.

Part 3, Chapter 1
General

Effective date 1 November 2010

■ *Section 4*
National and International Regulations

4.1 International Regulations

4.1.1 4.1.1 Attention is drawn to the necessity to comply with National and International Technical and Operational Regulations ~~of countries,~~ applicable where the ship is registered or operating and which may also contain requirements which are outside classification as defined in these Rules, e.g.

- The Directive of the European Parliament and of the Council of 12 December 2006 laying down technical requirements for Inland Waterway vessels (2006/87/EC).
- The 'Rhine Inspection Regulations' of the Central Rhine Commission (CCNR).
- ~~The Regulations of the Central Rhine Commission (CCNR) concerning the transport of dangerous goods on the river Rhine (ADNR).~~
- The Regulations concerning the European Agreement on the International carriage of dangerous goods by River (ADN).

Part 3, Chapter 3
Structural Design

Effective date 1 November 2010

■ *Section 4*
Design loading

4.3 Stowage rate and design loads

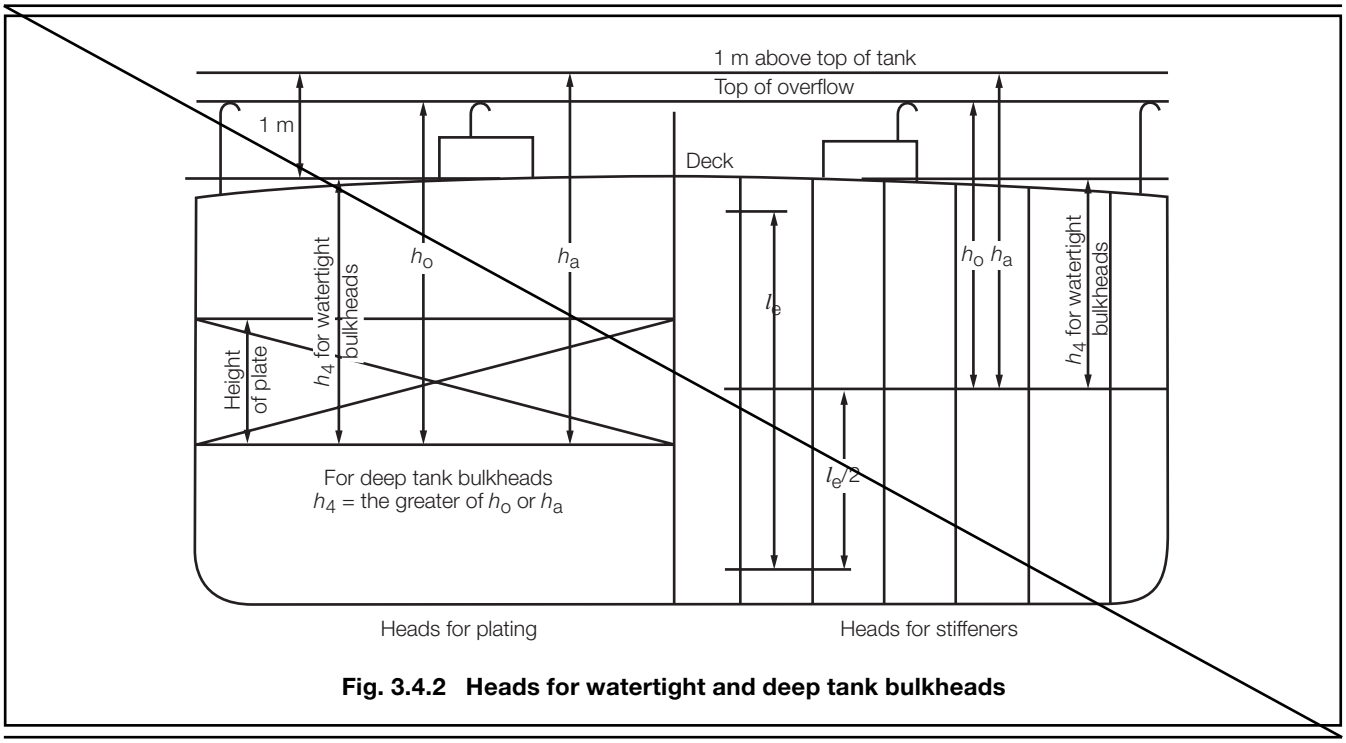
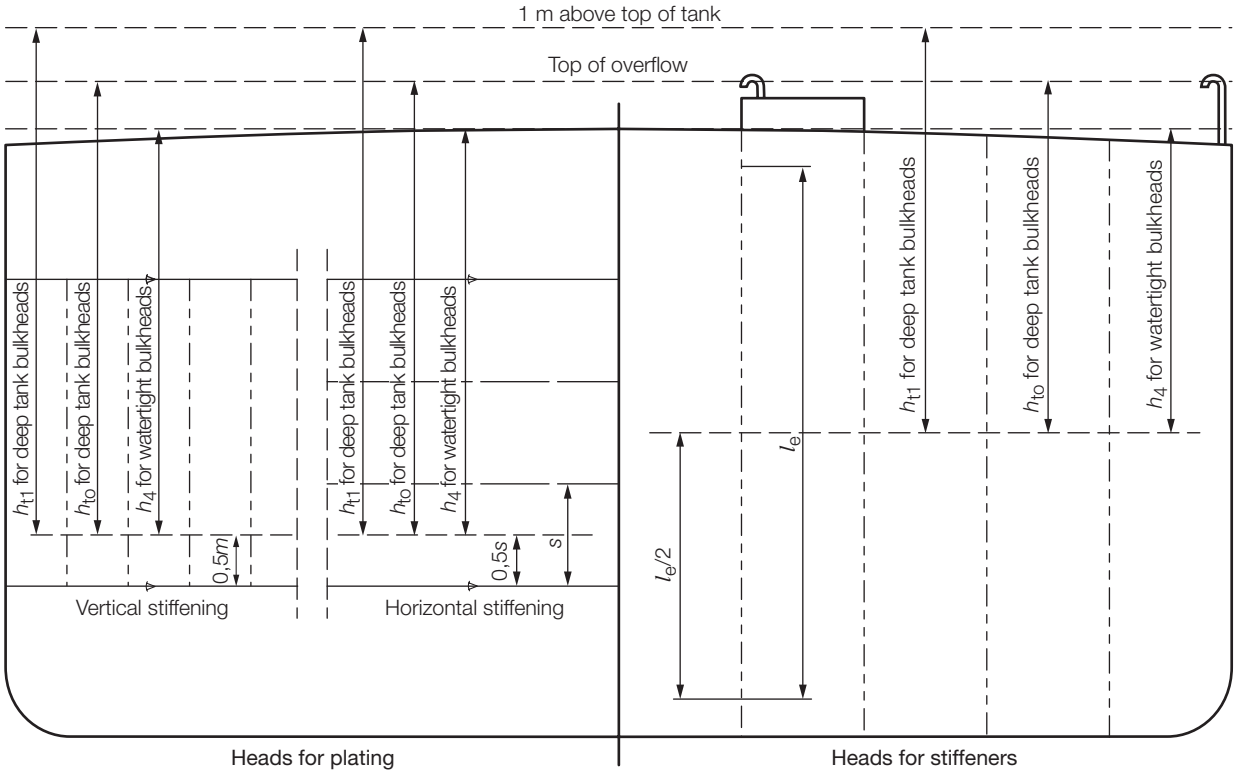


Fig. 3.4.2 Heads for watertight and deep tank bulkheads



h_4 = load head, in metres, measured vertically as follows:

(a) for vertically stiffened watertight bulkhead plating:
the distance from a point 0,5 m above the lower edge of the plate to the top of the bulkhead

(b) for horizontally stiffened watertight bulkhead plating:
the distance from the middle of the first panel above the lower edge of the plate to the top of the bulkhead

(c) for vertically stiffened deep tank bulkhead plating:
the distance from a point 0,5 m above the lower edge of the plate to a point 1 m above the top of the tank (h_{t1}), or to the top of the overflow (h_{to}), whichever is the greater

(d) for horizontally stiffened deep tank bulkhead plating:
the distance from the middle of the first panel above the lower edge of the plate to a point 1 m above the top of the tank (h_{t1}), or to the top of the overflow (h_{to}), whichever is the greater

(e) for watertight stiffeners or girders, the distance from the middle of the effective length to the top of the bulkhead

(f) for deep tank bulkhead stiffeners or girders, the distance from the middle of the effective length to a point 1 m above the top of the tank (h_{t1}), or to the top of the overflow (h_{to}), whichever is the greater

Fig. 3.4.2 Heads for watertight and deep tank bulkheads

Part 3, Chapter 5
Fore End and Aft End Structure

Effective date 1 November 2010

■ *Section 6*
Fore peak structure

6.2 Bottom Structure

Table 5.6.1 Fore peak structure (*part only shown*)

Symbols
l_e, *s*, *Z* and *t* are as defined in 1.4.1 l_{e1} = l_e but should be taken as not less than 2 m h_5 = load height, in metres, measured vertically as follows: (i) for vertically stiffened plating – the distance from a point 0,5 m above the lower edge of the plate to a point 1 m above the ~~tip~~ top of the bulkhead~~s~~, or to the top of the overflow, whichever is the greater (ii) for horizontally stiffened plating - the distance from the middle of the first panel above the lower edge of the plate to a point 1m above the top of the bulkhead, or to the top of the overflow, whichever is the greater ~~(ii)~~(iii) for stiffeners – the distance from the middle of the effective length to a point 1 m above the top of the bulkhead ~~at side~~, or to the top of the overflow, whichever is the greater

Part 3, Chapter 6
Machinery Spaces

Effective date 1 November 2010

■ *Section 4*
Single and double bottom structure

4.4 Water inlets

4.4.1 Water inlets and other openings such as openings for cooler boxes are to have well rounded corners. The thickness of water inlet and cooler box plating is to be ~~2~~ 4 mm greater than the adjacent shell plating, or ~~9~~ 12 mm, whichever is the greater. Suitable cathodic protection is to be provided inside the cooler boxes.

Part 3, Chapter 7
Bulkheads

Effective date 1 November 2010

■ *Section 1*
General

1.3 Collision bulkhead

1.3.1 A collision bulkhead is to be arranged at a suitable distance from the forward perpendicular ~~in such a way~~ at a location that, when the forepark is fully flooded, the ~~floatability~~ buoyancy of the fully loaded vessel is ~~ensured~~ sufficient and a residual safety distance of 100 mm from any opening which cannot be closed weathertight is attained.

■ *Section 2*
Scantlings of bulkheads

2.1 Watertight and deep tank bulkheads as indicated in 1.1.1

Table 7.2.1 Watertight and deep tank bulkhead scantlings (*Part only shown*)

Symbols
h_4 = load head, in metres, measured vertically as follows, *see also* Fig. 7.2.1 (a) for vertically stiffened watertight bulkhead plating – the distance from a point 0,5 m above the lower edge of the plate to the top of the bulkhead ~~(b) for deep tank bulkhead plating – the distance from the lower edge of the plate to a point 1 m above the top of the tank, or to the top of the overflow, whichever is the greater~~ (b) for horizontally stiffened watertight bulkhead plating - the distance from the middle of the first panel above the lower edge of the plate to the top of the bulkhead (c) for vertically stiffened deep tank bulkhead plating - the distance from a point 0,5 m above the lower edge of the plate to a point 1 m above the top of the tank, or to the top of the overflow, whichever is the greater (d) for horizontally stiffened deep tank bulkhead plating - the distance from the middle of the first panel above the lower edge of the plate to a point 1 m above the top of the tank, or to the top of the overflow, whichever is the greater ~~(c)~~(e) for watertight stiffeners or girders, the distance from the middle of the effective length to the top of the bulkhead ~~(d)~~(f) for deep tank bulkhead stiffeners or girders, the distance from the middle of the effective length to a point 1 m above the top of the tank, or to the top of the overflow, whichever is the greater

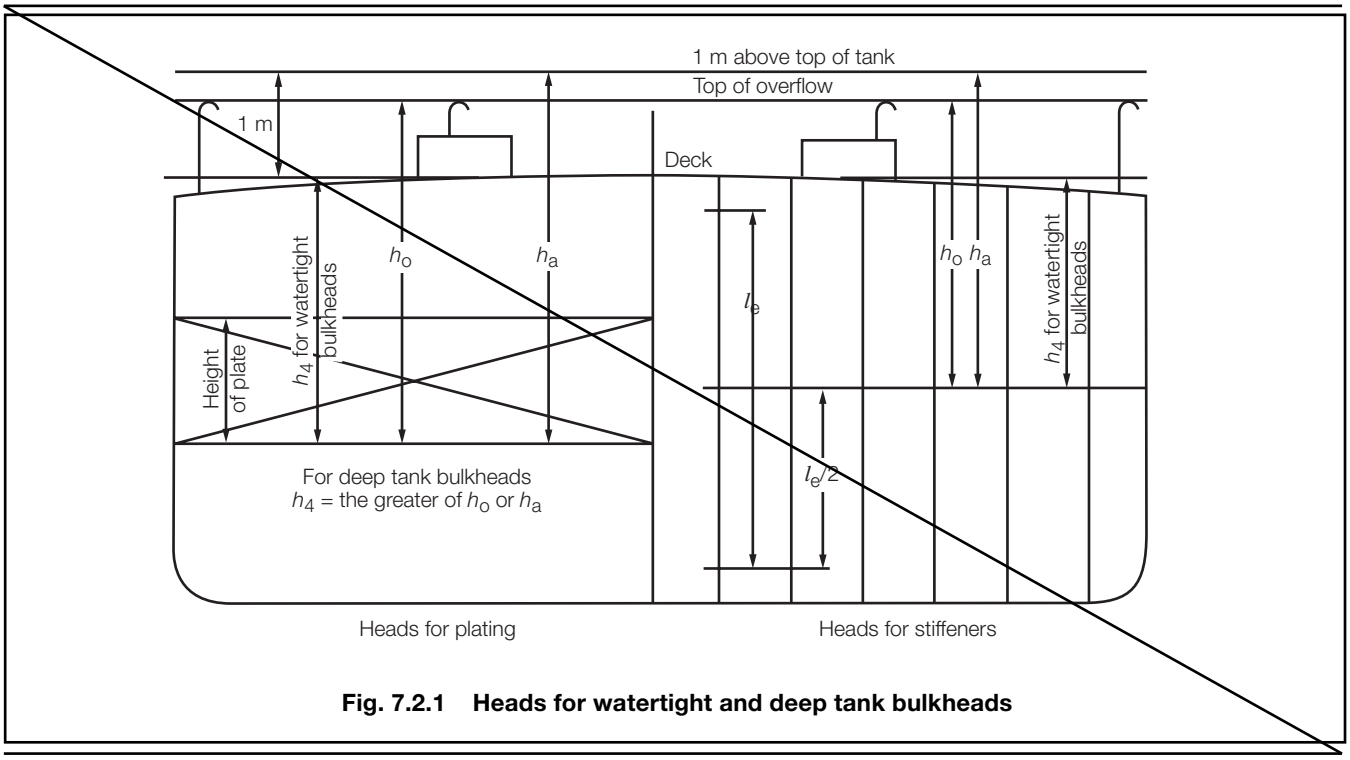


Fig. 7.2.1 Heads for watertight and deep tank bulkheads

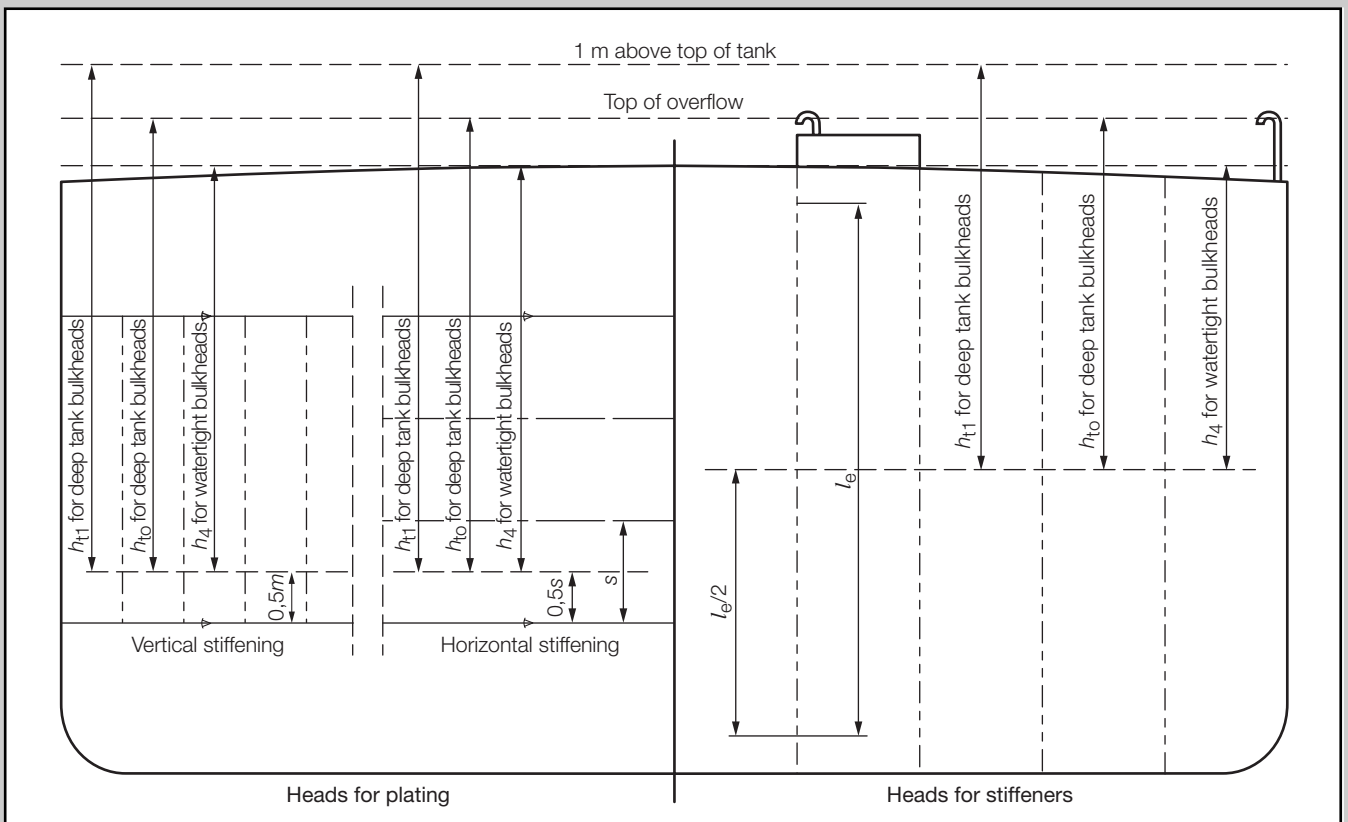


Fig. 7.2.1 Heads for watertight and deep tank bulkheads

Part 3, Chapter 10
Welding and Structural Details

Effective date 1 November 2010

■ *Section 2*
Welding

2.4 Doublers

2.4.1 When local doublers are used on the side shell plating to act as rubbing bars, full penetration welding of the butt welds is to be ensured and suitable ceramic backing bars or mineral fibre tapes are to be used for welding the butt welds to prevent actual attachment to the shell plating in way. The doublers are to be attached to the side shell plating with seam welding only after individual welding of the butt welds as described above. Doublers are not to be used in lieu of an inserted sheerstrake and are not to be included in the calculation of the hull section modulus.

Existing sub-Sections 2.4 *to* 2.7 *have been renumbered* 2.5 *to* 2.8.

Part 3, Chapter 12
Ship Control Systems

Effective date 1 November 2010

■ *Section 5*
Equipment

5.1 Scope

5.1.1 The requirements for anchoring equipment for the various ship types provided by this Section are for service in **Zone 1**, **Zone 2** and **Zone 3**, *see* Pt 1, Ch 2,2.

5.1.2 The anchors, cables, towlines and mooring wires required by this Section are based on the following conditions:
(a) Current of river, maximum 8 km/h;
(b) Anchoring grounds being such that an approved standard type anchor has a holding power in the particular soil not less than six times its weight.

5.1.3 When ships are intended to operate under environmental conditions differing from those detailed in 5.1.2, the anchoring and mooring equipment will be specially considered and may be modified to suit the actual conditions. A possible reduction in the requirements as in 5.7.2 is, however, not permitted when the ship has to comply with the regulations stipulated in 5.1.4.

5.1.4 The equipment of Inland Waterway vessels intended to navigate on the river Rhine and other European waterways must also comply with the Rhine Inspection Regulations or The Directive of the European Parliament and of the Council of 12 December 2006, laying down technical requirements for Inland Waterway vessels, as applicable.

5.2 General

5.2.1 To entitle a ship to the figure **1** in its character of classification, the equipment is to be provided in accordance with this Section or in accordance with established National or International Regulations as agreed by the Committee, e.g. the Rhine Inspection Regulations or The Directive of the European Parliament and of the Council of 12 December 2006 laying down technical requirements for Inland Waterway vessels.

5.2.2 Where the Committee has agreed that anchoring and mooring equipment need not be fitted in view of the particular service of the ship, the character letter **N** will be assigned. *See also* Pt 1, Ch 2,2.2.2.

5.2.3 Where the ship is intended to perform its primary designed service function only while it is anchored, moored, towed or linked, the character letter **T** will be assigned. *See also* Pt 1, Ch 2,2.2.2.

5.2.4 For classification purposes, the character figure **1**, or either of the character letters **N** or **T**, is to be assigned.

5.3 Symbols and definitions

5.3.1 The following symbols and definitions are applicable to this Chapter unless otherwise stated:

T as defined in Ch 1,6.1

L_{oa} is the overall length of the hull, in metres

B_e = the maximum breadth of the hull, in metres, measured to the outer edge of the shell plating at draught T

T_e = the maximum draught measured to the lowest outer part of the keel plate.

5.4 Bow anchors

5.4.1 For ships carrying cargoes, the total mass P of the bow anchors is to be calculated in accordance with the following formula:

$$P = k B_e T_e \text{ [kg]}$$

where

$$k = c \sqrt{\frac{L_{oa}}{8B_e}}$$

For pushbarges $k = c$

c: Coefficient as per Table 12.5.1.

Table 12.5.1 Values of coefficient *c*

Deadweight, in metric tonnes	Coefficient c
< 400	45
> 400 ≤ 650	55
> 650 ≤1000	65
> 1000	70

5.4.2 For passenger ships and ships not intended for the carriage of goods, such as tugs and launches, the total mass P of the bow anchors is to be calculated in accordance with the following formula, *see also* 5.4.5:

$$P = k B_e T_e \text{ [kg]}$$

where

$$k = c \sqrt{\frac{L_{oa}}{8B_e}}$$

c: Coefficient as per Table 12.5.1, except that, for obtaining this empirical coefficient, the maximum displacement in m^3 instead of the deadweight in metric tonnes shall be used.

5.4.3 The required mass calculated in accordance with 5.4.1 or 5.4.2, as applicable, applies to ordinary stockless bower anchors. When anchors of a design approved for the designation 'High Holding Power' (HHP) are used, the mass of each such anchor may be reduced by the percentages given in Table 12.5.2. HHP anchors not mentioned in Table 12.5.2 will be specially considered.

5.4.4 The number of anchors is to be in accordance with 5.6.

Table 12.5.2 High Holding Power Anchors

Type of anchor	Mass reduction %
HA – DU	30
D'Hone Special	30
Pool 1 (hollow)	35
Pool 2 (solid)	40
De Biesbosch – Danforth	50
Vicinay – Danforth	50
Vicinay AC 14	25
Vicinay Type 1	45
Vicinay Type 2	45
Vicinay Type 3	40
Stockes	35
D'Hone – Danforth	50
Schmitt high holding anchor	40

5.4.5 For passenger ships intended to navigate on the Rhine downstream of 855 km (Emmerich) for which a certificate needs to be issued in accordance with the Rhine Inspection Regulations, attention is drawn to the increased anchor mass requirements as per Chapter 10 of the Rhine Inspection Regulations.

5.5 Stern anchors

5.5.1 Stern anchors are not required for:

(a) Vessels for which the calculated stern anchor mass is less than 150 kg;

(b) Barges being pushed.

5.5.2 Vessels referred to in 5.4.1 with an overall length not exceeding 86 m shall be equipped with a stern anchor having a total mass of at least 25 per cent of mass P calculated in accordance with 5.4.1.

5.5.3 Vessels with an overall length exceeding 86 m shall be equipped with one or two stern anchors with a total mass of at least 50 per cent of mass P calculated in accordance with 5.4.1.

5.5.4 Vessels intended to propel rigid convoys not exceeding 86 m in length shall be equipped with stern anchors of a total mass at least equal to 25 per cent of the mass P calculated in accordance with 5.4.1 using the maximum main dimensions of the formation. The composition and maximum dimensions of the formation to be pushed will be entered in the class certificate.

5.5.5 Vessels intended to propel rigid convoys exceeding 86 m in length shall be equipped with stern anchors of a total mass at least equal to 50 per cent of the mass P calculated in accordance with 5.4.1 using the maximum main dimensions of the formation. The composition and maximum dimensions of the formation to be pushed will be entered in the class certificate.

5.5.6 The required mass calculated in accordance with 5.5.2 to 5.5.5 applies to ordinary stockless stern anchors. When anchors of a design approved for the designation 'High Holding Power' (HHP) are used, the mass of each such anchor may be reduced by the percentages given in Table 12.5.2.

5.6 Number of anchors

5.6.1 The total mass *P* as required for bow anchors may be distributed between one or two anchors.

5.6.2 Where a vessel is equipped with only a single bow anchor and the hawse pipe is located amidships, the mass *P* may be reduced by 15 per cent.

5.6.3 The total mass required for stern anchors for pushers and vessels whose maximum length exceeds 86 m may be distributed between one or two anchors.

5.6.4 The mass of the lightest anchor shall not be less than 45 per cent of the required total mass for the anchors.

5.7 Correction of required minimum mass

5.7.1 Where the maximum current expected in service considerably exceeds 8 km/h, the anchor mass required by 5.4.1 or 5.4.2 is to be increased by the factor:

$$\left(\frac{\text{current speed, in km/hr}}{8}\right)^{1,875}$$

5.7.2 Where the maximum current expected in service is less than 8 km/h, the anchor mass required by 5.4.1 or 5.4.2 may be reduced by the factor:

$$\left(\frac{\text{current speed, in km/hr}}{8}\right)^{0,5}$$

5.7.3 The reduction allowed by 5.7.2 does not apply for ships which need to comply with 5.1.4.

5.8 Anchors' general requirements

5.8.1 Anchors are to be of an approved design and of a type suitable for the intended service. The design of all anchor heads is to be such as to minimise stress concentrations and, in particular, the radii on all parts of cast anchor heads are to be as large as possible, especially where there is considerable change of section.

5.8.2 The mass of the head, including pins and fittings, of an ordinary stockless anchor is to be not less than 60 per cent of the total mass of the anchor.

5.8.3 The use of cast iron anchors is prohibited.

5.9 Chain cables

5.9.1 The minimum breaking load of chain cables shall be determined in accordance with Table 12.5.3.

5.9.2 The minimum length of each chain cable shall be determined in accordance with Table 12.5.4.

5.9.3 Chain cables may be either short link or stud link and of mild steel or special quality steel, in accordance with the requirements of Chapter 10 of LR's *Rules for the Manufacture, Testing and Certification of Materials* (hereinafter referred to as the Rules for Materials) and are to be graded in accordance with Table 12.5.5.

5.9.4 The use of steel wires instead of anchor chains is permitted. Steel wires are to have a breaking strength not less than that required for chain cables and their length is to be 20 per cent greater than the required length of the chain cable.

5.9.5 Where wire rope is used in lieu of chain cable for anchoring, galvanised wire rope with an independent wire core in accordance with Ch 10,6 of the Rules for Materials is to be used. Wire rope terminal fittings are to comply with an acceptable code or standard. The strength of terminations, connecting fittings, shackles or links is not to be less than that of the anchor line.

5.9.6 In conjunction with HHP anchors, only Grade U2 or ISO Grade 40 chain cable is to be used, except that, when desired by Owners, for HHP anchors having a mass of 300 kg or less, Grade U1 chain cable may be used, provided the required breaking strength of the chain cable as per 5.9.1 is increased by 10 per cent.

5.9.7 The form and proportions of links and shackles are to be in accordance with Chapter 10 of LR's Rules for Materials and/or with International Standard ISO/R 1834–1971, ISO/R 1835–1971, ISO/R 1836–1971, ISO/1704–1973 or DIN 766A.

5.10 Towlines and mooring lines

5.10.1 Ships with an overall length not less than 20 m shall be equipped with at least 3 mooring lines. Their lengths are to be in accordance with Table 12.5.6.

5.10.2 The required breaking strength of the mooring lines is to be in accordance with Table 12.5.7.

5.10.3 Tugs intended for towing shall be equipped with a number of towlines suitable for the intended service. The main towline shall have a length of at least 100 m and shall have a breaking load, in kN, not less than one third of the total power, in kW, of the main engine(s).

5.10.4 Motor ships and pushers intended for towing shall be equipped with a towline having a length of at least 100 m and a breaking load, in kN, not less than one quarter of the total power, in kW, of the main engine(s).

5.10.5 Towlines and mooring lines may be of wire, natural fibre or synthetic fibre. The diameter, construction and specification of wire or natural fibre towlines are to comply with the requirements of Chapter 10 of LR's Rules for Materials.

5.10.6 Attention is drawn to the requirements of the ADN where it is required that tankers of Type G, C and N are being moored with steel wires during loading and discharging.

Table 12.5.3 Minimum breaking load *R* of chain cable

Anchor mass [kg]	*R*[kN]
≤ 500	0,35*P*
> 500 and ≤ 2000	$\left(0{,}35 - \frac{P' - 500}{15\,000}\right) P'$
> 2000	0,25*P*'
Symbols	
P' = The theoretical mass of the anchor as determined in accordance with 5.4 to 5.7 Where the actual anchor mass is greater than required, *P* ' is to be taken as the actual anchor mass Where the actual anchor is an anchor of the High Holding Power type, the equivalent mass of a normal anchor is to be used for *P*'	

Table 12.5.4 Minimum length of chain cable

Overal length of vessel, L_{oa} in m	Minimum length of chain cable, in metres	
	Zones 2 and 3	Zone 1
< 30	40	L_{oa} + 10 with a minimum of 40 m and need not be greater than 100 m
≥ 30 and ≤ 50	L_{oa} + 10	
> 50	60	

Table 12.5.5 Chain cable steel grades

Grade	Material	Tensile strength	
		N/mm^2	(kgf/mm^2)
U1	Mild steel	300–490	(31–50)
U2(a)	Special quality steel (wrought)	490–690	(50–70)
U2(b)	Special quality steel (cast)	490–690	(50–70)

Table 12.5.6 Required length of mooring lines

Item	Requirement
1st Line	L_{m1} = L_{oa} + 20 but need not be greater than 100 m
2nd Line	L_{m2} = 2/3 L_{m1}
3rd Line	L_{m3} = 1/3 L_{m1}
L_{m1}, L_{m2}, L_{m3} = required length of respective mooring line, in metres The 3rd line need not be fitted on ships having a length less than 20 m	

5.10.7 Means are to be provided to enable mooring lines to be efficiently secured on board ship by an adequate number of suitably placed bollards on either side of the ship.

Table 12.5.7 Required breaking load of mooring lines

For ships where	Requirement
L_{oa} x *B*e x Te ≤ 1000	R_s = 60 + 0,1 (L_{oa} B_e T_e)
L_{oa} x *B*e x *T*e ≤ 1000	R_s = 150 + 0,01 (L_{oa} B_e T_e)
R_s = minimum breaking load, in kN	

5.11 Testing of equipment

5.11.1 All anchors and chain cables are to be tested at establishments and on machines recognised by the Committee and under the supervision of LR's Surveyors or other Officers recognised by the Committee, and in accordance with Chapter 10 of LR's Rules for Materials.

5.11.2 Test certificates showing particulars of weights of anchors, or size and weight of cable and of the test loads applied are to be provided. These certificates are to be examined by the Surveyors when the anchors and cables are placed on board the ship.

5.11.3 For holding power testing requirements relating to High Holding Power anchors, *see* Ch 10,1.7 of the Rules for Materials. As an alternative, Directive No. 7 to the Rhine Inspection Regulations may also be used.

5.11.4 Steel wire and fibre ropes are to be tested as required by Chapter 10 of LR's Rules for Materials.

5.11.5 For ships certified in accordance with the Rhine Inspection Regulations or The Directive of the European Parliament and of the Council of 12 December 2006 laying down technical requirements for Inland Waterway vessels, a certificate in accordance with European standard EN 10 204:1991 shall be kept on board for the required towlines and mooring lines.

5.12 Windlasses

5.12.1 The requirements of 5.9.2 to 5.9.5 apply equally to bow and stern anchor winches.

5.12.2 On ships equipped with anchors having a mass of over 50 kg, windlass(es) of sufficient power and suitable for the type and size of chain cable are to be fitted. Arrangements for anchor davits will be specially considered.

5.12.3 The windlasses may be hand or power-operated. Hand operated windlasses are only acceptable if the effort required at the handle does not exceed 15 kgf for raising one anchor at a speed of not less than 2 m/min and making about 30 turns of the handle per minute.

5.12.4 The capability of the power-operated windlass to break out and raise the anchor at a mean speed of not less than 9 m/min is to be proven during the trials.

5.12.5 Winches suitable for operation by hand as well as by external power are to be so constructed that the power drive cannot activate the hand drive.

5.13 Structural requirements

5.13.1 The windlass or winch is to be efficiently bedded and secured to the deck. The thickness of the deck in way of the windlass in combination with the stiffening arrangement is to be adequate in connection with the loads imposed by the winch. Adequate stiffening is to be provided, to the Surveyor's satisfaction. The structural design integrity of the bedplate is the responsibility of the Shipbuilder and windlass or winch manufacturer.

5.13.2 An easy lead of the cables from the windlass to the anchors and chain lockers is to be arranged. Where cables pass over or through stoppers, these stoppers are to be manufactured from ductile material and be designed to minimise the probability of damage to, or snagging of, the cable. They are to be capable of withstanding without permanent deformation a load equal to 80 per cent of the Rule breaking load of the cable passing over them.

5.13.3 Hawse pipes and anchor pockets are to be of ample thickness and of a suitable size and form to house the anchors efficiently, preventing, as much as practicable, slackening of the cable or movements of the anchor being caused by wave action. The shell plating and framing in way of the hawse pipes are to be reinforced as necessary. In case a bulbous bow has been fitted, reinforcing is also to be arranged in way of those parts of bulbous bows liable to be damaged by anchors or cables. Substantial chafing lips are to be provided at shell and deck. These are to have sufficiently large, radiused faces to minimise the probability of cable links being subjected to high bending stresses.

5.13.4 The chain locker is to be of a capacity and depth adequate to provide an easy direct lead for the cable into the chain pipes, when the cable is fully stowed. Chain or spurling pipes are to be of suitable size and provided with chafing lips. The port and starboard cables are to be separated by a division in the locker.

5.13.5 Where means of access is provided to the chain locker, it is to be closed by a substantial cover and secured by closely spaced bolts.

5.13.6 Chain lockers and spurling pipes are to be watertight up to the exposed weather deck and the space is to be efficiently drained. However, bulkheads between separate chain lockers, or which form a common boundary of chain lockers, need not be watertight.

5.13.7 Provision is to be made for securing the inboard ends of the cables to the structure. This attachment should have a working strength of not less than 63,7 kN (6,5 tonne-f) or 20 per cent of the breaking strength of the chain cable, whichever is the greater, and the structure to which it is attached is to be adequate for this load. Attention is drawn to the advantages of arranging so that the cable may be slipped from an accessible position outside the chain cable locker. The proposed arrangement for slipping the chain cable, if constructed outside the chain locker, must be made watertight.

5.13.8 When wire rope instead of chain is used for the anchor cable, it is to be stored on a suitably designed drum or reel. Fairleads intended for use with wire rope cable are to be designed to minimise wear and to avoid kinking or other damage occurring to the rope.

Part 4, Chapter 1
Dry Cargo Ships

Effective date 1 November 2010

■ *Section 1*
General

1.3 Class notation

1.3.5 Double-hull ships built in compliance with Chapter 9, Section 9.1.0.80 of the ~~ADNR/~~ADN and complying with the additional requirements of Section 12 of this Chapter will be eligible to be classed:

DG

where DG stands for Dangerous Goods.

■ *Section 5*
Hull envelope plating

5.3 Shell plating

~~*5.3.2* When local doublers are used on the side shell plating to act as rubbing bars, full penetration welding of the is to be ensured and suitable backing bars or copper shims are to be used for welding the butt welds to prevent actual attachment to the shell plating in way. The doublers are to be attached to the sideshell plating with seam welding only after individual welding of the butt welds as described above. Doublers are not to be used in lieu of an inserted sheerstrake as required by 5.5. Doublers are not to be included in the calculation of the hull section modulus.~~

■ *Section 12*
Additional requirements for ships carrying dangerous goods

12.1 General

12.1.1 This Section applies to ships which are to be built in accordance with the additional requirements set out in Chapter 9, Section 9.1.0.80 of the ~~ADNR/~~ADN. Ships complying with the requirements of this Section will be eligible to receive the additional Class Notation in accordance with 1.3.5.

12.1.2 The ~~ADNR and~~ ADN is the regulation for the transport of dangerous goods on European waterways. The abbreviation **ADN** stands for:

Accord européen relatif au transport international des marchandises **D**angereuses par voies de **N**avigation intérieures.

~~The letter '**R**' was added and stands for Rhine.~~

12.1.3 The exemptions and derogations to the ADN ~~and to the ADNR~~, as authorised by the ~~CCNR~~, UNECE (United Nations Economic Commission for Europe) - Experts on ADN, may also be taken into consideration.

12.1.4 The structural and other arrangements of dry cargo ships for the carriage of dangerous goods in bulk, to be registered in, or to operate in countries with Regulations differing from ADN ~~and ADNR~~ will receive appropriate special consideration if required by the relevant Authorities and/or desired by the Owner.

~~*12.1.5* At the time of publishing of these Rules, the ADNR was still in force as the governing regulations concerning the transport of dangerous goods on the river Rhine. In terms of its validity on the river Rhine it is, however, foreseen that the ADNR will eventually be replaced by the ADN. Until then, subsequent references to the ADN in further paragraphs can also be considered as being references to the ADNR, as long as the ADNR has not been superseded by the ADN.~~

Existing paragraphs 12.1.6 *to* 12.1.8 *have been renumbered* 12.1.5 *to* 12.1.7.

12.2 Dangerous goods

12.2.1 The following categories of dangerous goods are identified in Part 2 of the ~~ADNR/~~ADN:

Class 1	Explosive substances and articles
Class 2	Gases
Class 3	Flammable liquids
Class 4.1	Flammable solids, self-reactive substances and solid desensitised explosives
Class 4.2	Substances liable to spontaneous combustion
Class 4.3	Substances which, in contact with water, emit flammable gases
Class 5.1	Oxidising substances
Class 5.2	Organic peroxides
Class 6.1	Toxic substances
Class 6.2	Infectious substances
Class 7	Radioactive material
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous substances and articles.

12.2.2 Table A as listed in Part 3 of the ~~ADNR/~~ADN contains the list of dangerous goods in numerical order (UN number or identification number). This Table also contains data concerning the permitted form of carriage in Inland Waterways vessels.

12.3 Limiting quantities of dangerous goods

12.3.1 Part 7 of the ~~ADNR/~~ADN contains requirements concerning the maximum quantities of dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 7, 8 and 9 which may be carried on one ship.

12.3.2 Ships intended to carry dangerous goods of Classes 2, 3, 4.1, 5.2, 6.1, 7, 8 or 9 – except those for which label No. 1 is prescribed in column (5) of Table A of Ch 3,2 – in quantities exceeding those referred to in paragraph 7.1.4.1.1 of the ~~ADNR/~~ADN, shall also comply with the requirements of 12.4, 12.5, 12.6 and 12.7.

12.7 Stability

12.7.1 Attention is drawn to the ~~ADNR/~~ADN damage stability requirements. Verification of compliance with these regulations is usually dealt with by the National Authorities, but upon request, verification by the Society followed by issuing a statement of compliance can also be arranged.

Part 4, Chapter 2
Ferries and Roll on – Roll off Ships

Effective date 1 November 2010

■ *Section 3*
Topside structure and deck structure

3.4 Sheerstrakes

3.4.1 The sheerstrake is to comply with the requirements of Table 2.3.1.

Existing sub-Sections 3.4 *and* 3.5 *have been renumbered* 3.5 *and* 3.6.

Table 2.3.1 Deck plating and sheerstrake

Item and parameter	Longitudinal framing	Transverse framing
(1) Deck plating thickness	The greater of: $t = (5{,}6 + 0{,}039L)\sqrt{s}$ mm $t = 10s$ mm *See* Note 2 in Table 2.3.2	The greater of: $t = (5{,}6 + 0{,}039L)\sqrt{s}$ mm $t = 10s$ mm *See* Note 2 in Table 2.3.2
	but for ships with a length, L, exceeding 40 m, t is to be not less than:	
	The greater of: $t = 0{,}076\frac{M}{B \times D} - \frac{a_1}{10B}$ mm $t = 2{,}3\sqrt[3]{\frac{MS \times s^2}{B \times D}}$ mm	The greater of: $t = 0{,}076\frac{M}{B \times D}$ mm $t = 3{,}85\sqrt[3]{\frac{MS \times s^2}{B \times D \times C_1}}$ mm
(2) Sheerstrake thickness and width	As required by Table 1.5.1 in Ch 1,1, *see* Note	
NOTE For ships having a length L less than 40 m the sheerstrake may be replaced by the normal side shell plating, provided a suitable doubler plate or half round pipe is fitted in way.		

Part 4, Chapter 4
General Requirements For Tankers Carrying Dangerous Liquids in Bulk

Effective date 1 November 2010

■ *Section 1*
General

1.1 Application and definitions

(*Part only shown*)

1.1.2 **Packing group** means a group to which, for packing purposes, certain substances may be assigned in accordance with their degree of danger. The packing groups have the following meanings which are explained more fully in Part 2 of the ~~ADNR/~~ADN:

- Packing group I: Substances presenting high danger;
- Packing group II: Substances presenting medium danger; and
- Packing group III: Substances presenting a ~~low~~ lower danger.

1.2 International Regulations

1.2.1 The requirements of Lloyd's Register's (hereinafter referred to as LR) *Rules and Regulations for Classification of Inland Waterways Ships* (hereinafter referred to as the Rules for Inland Waterways Ships) intended for the carriage of dangerous liquids in bulk are based on the following international regulations:

- The United Nations' ADN regulations:
  The European Agreement concerning the International Carriage of Dangerous Goods by River;
- ~~The ADNR regulations:~~
  ~~*The Regulations of the Central Rhine Commission (CCNR) concerning the transport of dangerous goods on the river Rhine (ADNR). See* www.ccr-zkr.org.~~

1.2.2 The exemptions and derogations to the ADN ~~and to the ADNR,~~ as authorised by the UNECE ~~and the CCNR~~, (United Nations Economic Commission for Europe) – Experts on ADN may also be taken into consideration.

1.2.3 The structural and other arrangements of tankers for the carriage of dangerous liquids in bulk, to be registered in, or to operate in countries with Regulations differing from ADN ~~and ADNR~~ will receive appropriate special consideration if required by the relevant Authorities and/or desired by the Owner.

~~*1.2.4* At the time of publishing of these Rules, the ADNR was still in force as the governing regulations concerning the transport of dangerous goods on the river Rhine. In terms of its validity on the river Rhine it is, however, foreseen that the ADNR will eventually be replaced by the ADN. Until then, subsequent references to the ADN in further paragraphs can also be considered as being references to the ADNR, as long as the ADNR has not been superseded by the ADN.~~

~~*1.2.5*~~ *1.2.4* Although the contents of this Chapter take the ADN ~~and ADNR~~ Regulations into account, the issue of an ADN ~~or ADNR~~ Certificate on behalf of the Relevant Authorities requires full compliance with their Regulations.

~~*1.2.6*~~ *1.2.5* Special attention is drawn to National and International technical and operational requirements of countries where the ship is registered or operating, which are outside classification as defined in the Rules and Regulations.

~~*1.2.7*~~ *1.2.6* Electronic copies of the ADN can be downloaded from the site of the United Nations Economic Commission for Europe at

~~http://www.unece.org/trans/danger/adn_agree.html~~
http://www.unece.org/publications/transport/dg_adn.html

~~*1.2.8* Electronic copies of the ADNR can be downloaded from the site of the Central Commission for Navigation on the Rhine at www.ccr-zkr.org.~~

1.7 Stability

1.7.1 The intact or damage stability of tankers of Type G, C or N is to be in accordance with recognised international stability requirements such as laid down in the ~~ADNR or~~ ADN. The stability calculations are to be approved by the competent National Authority. At the request of the Owner or builder, and as delegated by the Competent National Authority, LR can also issue a Statement of Compliance with specific national or international stability requirements.

Part 4, Chapter 5
Tankers of Type G

Effective date 1 November 2010

■ *Section 1*
General

1.1 Application

1.1.1 This Chapter applies to propelled and non-propelled tankers (barges) of Type G, intended for the carriage of dangerous liquids of Class 2 in bulk, in association with a List of Defined Chemical Cargoes and with class notations as indicated in 1.5. Although the ships will be primarily designed for the carriage of Class 2 liquids they could also be entitled to carry products of Classes 3, 6.1, 8 and 9 as permitted by the ~~ADNR~~ ADN.

1.1.6 The requirements of this Chapter take into account the ~~ADNR Regulations of the Central Rhine Commission and the~~ European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway (ADN) which assume heavy traffic on relatively narrow waterways through heavily populated areas.

1.1.7 Ships intended to be used on waterways with conditions different from those stated in 1.1.6, and where ~~ADNR and~~ ADN requirements are not applicable, will receive special consideration and the requirements may be modified to suit the actual conditions, *see also* Ch 4,1.2.

1.1.8 Although the contents of this Chapter and those of Chapter 4 take ~~ADNR and~~ ADN technical Regulations into account, the issue of an ~~ADNR~~ ADN certificate by or on behalf of the relevant Authorities, requires full compliance with their Regulations, which are to be consulted in all cases.

1.1.9 Where requested to do so by the Builder or Owner, LR will investigate compliance with the ADN ~~Recommendations or ADNR~~ Regulations indicated in 1.1.8 with a view to issuing a Statement of Compliance.

1.2 Ship arrangement

1.2.3 For ~~ADNR and~~ ADN related requirements such as the arrangement of cofferdams, double sides (as applicable), service spaces and accommodations, entrances and the protection against the ingress of gases and special requirements for Type G tankers, *see* Ch 4,3.

1.2.5 The maximum tank capacity in accordance with the ~~ADNR~~ ADN is to be determined in accordance with Ch 4,3.2. The ~~ADNR~~ ADN, however, offers deviations of the prescribed tank capacities, provided the crashworthiness of the vessel is suitably increased. This may be achieved by one, or a combination of the measures described in 1.3.5.

1.3 Structural configuration

1.3.4 For ~~ADNR and~~ ADN related structural requirements regarding double and single hull structures, the arrangements of cargo tank supports and miscellaneous structural requirements, *see* Ch 4,3.5.

1.3.5 In case the ship is provided with tanks exceeding the maximum tank capacity in accordance with the ~~ADNR~~ ADN as described in 1.2.5; one, or a combination of the following measures needs to be taken:

- Increase in side shell and/or tank plating thicknesses, increase of stiffening arrangements or scantlings and spacings of primary members.
- Increase in the overall width of the double skin.
- Introduction of additional structural members.
- The appliance of special crashworthy structures.

In the above cases, the increased collision capabilities are to be proven by additional direct and statistical calculations as required by the ~~ADNR~~ ADN. These calculations should be submitted to, and be approved by the Society.

1.5 List of Defined Cargoes

1.5.3 The List of Defined Cargoes will be issued by the Society and will be based on Table C of Part 3 of the ~~ADNR~~ ADN. Parameters will include the tanker type, cargo tank design and cargo tank type as well as the characteristics of all relevant equipment fitted in the cargo zone. All relevant parameters of Table C will be used as a basis for the list, including any relevant additional requirements contained in column 20. Attention is also drawn to Ch 4,1.5 in respect of material compatability.

■ *Section 2*
Cargo characteristics and requirements for carriage

2.2 Filling limits for cargo tanks

2.2.3 For Class 3, 6.1, 8 and 9 products, higher filling rates in accordance with Table C of Part 3 of the ~~ADNR~~ ADN are allowed.

■ *Section 6*
Single bottom structure in way of cargo compartment space

6.1 General

6.1.5 For ~~ADNR and~~ ADN related structural requirements regarding cargo tank supports, *see* Ch 4,3.5.

■ *Section 7*
Double bottom structure in way of cargo compartment space

7.1 General

7.1.5 For ~~ADNR and~~ ADN related structural requirements regarding cargo tank supports, *see* Ch 4,3.5.

■ *Section 8*
Side shell framing in way of cargo compartment space

8.4 Reinforcement of single skin side shell

8.4.1 For ~~ADNR and~~ ADN related structural requirements regarding minimum structural requirements for single skin side shell structures, *see* Ch 4,3.5.

■ *Section 9*
Longitudinal bulkheads

9.2 Structural requirements

9.2.3 Watertight transverse bulkheads are to be fitted between the shell and the longitudinal bulkheads in such a way that the ~~ADNR~~ ADN damage stability requirements are fulfilled. *See also* Ch 4,1.7.

Part 4, Chapter 6
Tankers of Types C and N

Effective date 1 November 2010

■ *Section 1*
General

1.1 Application

1.1.5 The requirements of this Chapter take into account the ~~ADNR Regulations of the Central Rhine Commission and the~~ European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway (ADN) which assume heavy traffic on relatively narrow waterways through heavily populated areas.

1.1.6 Ships intended to be used on waterways with conditions different from those stated in 1.1.4 and where ~~ADNR and~~ ADN requirements are not applicable will receive special consideration and the requirements may be modified to suit the actual conditions, *see also* Ch 4,1.2.

1.1.7 Although the contents of this Chapter and those of Chapter 4 take ~~ADNR and~~ ADN technical Regulations into account, the issue of an ~~ADNR~~ ADN certificate by or on behalf of the relevant Authorities, requires full compliance with their Regulations, which are to be consulted in all cases.

1.1.8 Where requested to do so by the Builder or Owner, Lloyd's Register (hereinafter referred to as LR) will investigate compliance with the ADN ~~Recommendations or ADNR~~ Regulations indicated in 1.1.7, with a view to issuing a Statement of Compliance.

1.2 Ship arrangement

1.2.2 For ~~ADNR and~~ ADN related requirements such as the arrangement of cofferdams, double sides (as applicable), service spaces and accommodations, entrances and the protection against the ingress of gases and special requirements for Type C and N tankers, *see* Ch 4,3.

1.5 List of Defined Cargoes

1.5.3 The List of Defined Cargoes will be issued by the Society and will be based on Table C of Part 3 of the ~~A.D.N.R.~~ ADN. Parameters will include the tanker type, cargo tank design and cargo tank type as well as the characteristics of all relevant equipment fitted in the cargo zone. All relevant requirements of Table C will be used as a basis for the list, including any relevant additional requirements contained in column 20. Attention is drawn to Ch 4,1.5.3 and Ch 4,1.5.4 in respect of material compatibility.

■ *Section 3*
Hull envelope plating

3.3 Shell plating

~~*3.3.2 When local doublers are used on the sideshell plating to act as rubbing bars, full penetration welding of the buttwelds is to be ensured and suitable backing bars or copper shims are to be used for welding the buttwelds to prevent actual attachment to the shell plating in way. The doublers are to be attached to the sideshell plating with seam welding only after individual welding of the buttwelds as described above. Doublers are not to be used in lieu of the inserted sheerstrake required by 3.5. Doublers are not to be included in the calculation of the hull section modulus.*~~

~~*3.3.3*~~ *3.3.2* Where a reduced width of the double skin is proposed on Type C tankers, the thickness of the sideshell plating is to be increased, *see* 3.11.2.

■ *Section 5*
Hull envelope framing – Longitudinally framed ships

5.1 General

Table 6.5.1 Hull framing – Longitudinally framed ships – Secondary structure

Item	Parameter	Requirement (*See* Notes 1 and 2)
Bottom longitudinals single skin	Modulus	$Z = K\,[0{,}34 + 0{,}46h_b + L_1\,(0{,}112 - 0{,}009h_b)]\,h_b\,s\,l_e^2$ cm^3
Bottom longitudinals Double skin (~~*see* Table 6.5.2~~)	Modulus	~~$Z = (3{,}95 + 0{,}04L_1) \times D_2\,s\,l_e^2$ cm^3~~ $Z = (3{,}95 + 0{,}04L_1)\,D_2\,s\,l_e^2$ cm^3
Inner bottom longitudinals Double skin (~~*see* Table 6.5.2~~)	Modulus	$Z = 6s\,l_e^2\,h_g$ cm^3
Side longitudinals, single skin	Modulus	$Z = (4 + 0{,}04L_1)\,s\,l_e^2\,h_g$ cm^3
Side longitudinals, double skin	Modulus	$Z = (4{,}6 + 0{,}0342L_1)\,s\,l_e^2\,h_f$ cm^3
Deck, trunkside and trunk deck longitudinals	Modulus Inertia	$Z = [h - 3 + (0{,}18 - 0{,}02h_g)\,L_1]\,h_g\,s\,l_e^2$ cm^3 $I = 2{,}3l_e Z$ cm^4

NOTES
1. In case the scantlings of longitudinal members result in an appreciable excess in the hull midship section modulus as required by Pt 3, Ch 4 for the ship type concerned, a reduction in the relevant members may be applied, provided the permissible combined bending stress and the permissible local bending stress are not exceeded. For permissible stresses, *see* Section 11.
2. The minimum compartment thickness of the tank structure is not to be less than as required by 1.10.

■ *Section 7*
Longitudinal and transverse bulkheads of integral cargo tanks

7.1 General

(*Part only shown*)

Table 6.7.1 Scantlings of plane and corrugated transverse and longitudinal bulkheads of integral cargo tanks

Item	Parameter	Requirement
Plating	Thickness	Plane bulkheads $t = 4sf\sqrt{kh_g} + K_c$ mm Corrugated bulkheads $t = 4w\sqrt{kh_g} + K_c$ mm
Stiffeners	Modulus	$Z = 6ks\, l_e^2\, h_g$ cm^3
Corrugations *See* Note 2	Modulus Inertia	$Z = 7{,}5ks\, l_e^2\, h_g$ cm^3 $I = 3{,}2 l_e\, Z$ cm^4
Stringers and webs supporting stiffeners	Modulus	$Z = 6{,}6k\, S\, l_e^2\, h_g$ cm^3
Webs supporting stringers	Modulus	Z is to be determined by calculations using a stress of $\frac{124}{k}$ N/mm^2 $\left(\frac{12{,}60}{k}\right.$ kg/mm^2$\left.\right)$ assuming fixed ends, in association with the head, h_g

Symbols

Z, I, S, t, s, l_e, ρ and h_d as defined in 1.12.1

$f = 1{,}1 - \frac{s}{2.5S}$

h = load height, in metres, measured vertically as follows:
- (a) for vertically stiffened plating, the distance from a point 0,5 m above the lower edge of the plate to the top of the tank
- (b) for horizontally stiffened plating, the distance from the middle of the first panel above the lower edge of the plate to the top of the tank
- (c) for vertically corrugated bulkheads, the distance from a point 0,5 m above the lower edge of the corrugation to the top of the tank
- (d) for horizontally corrugated bulkheads, the distance from the middle of the panel of the corrugation to the top of the tank
- ~~(b)~~ (e) for stiffening members, the distance from the middle of the effective length to the top of the tank

$h_g = h\rho + h_d + 0{,}2$ m

$k = \frac{235}{\sigma_o}\left(\frac{24}{\sigma_o}\right)$ or 0,66, whichever is the greater

where

σ_o = specific minimum yield stress in N/mm^2 (kgf/mm^2)

w = width of flange (b) or web (c), in metres, whichever is the greater, *see* Fig. 3.3.3 in Pt 3, Ch 3,3

K_c = 1,5 for mild steel, for solid stainless steel, *see* Table 6.7.2

7.1.3 Longitudinals ~~are, generally, to~~ may either be carried through transverse bulkheads, ~~. If they~~ or may stop ~~at transverse bulkheads~~, in way. In case longitudinals terminate at transverse bulkheads brackets are to be fitted interconnecting the longitudinals. These are to be arranged such that the cross-sectional area of the longitudinals is maintained, *see* Pt 3, Ch 10,3.3.1(c).

7.1.4 When the ship is longitudinally framed in deck and bottom, the vertical stiffeners on transverse bulkheads are to be in line with the deck and bottom longitudinals.

7.1.5 Where, in accordance with Table 6.7.1, higher tensile steels are used in the construction of plane or corrugated bulkheads, structural items forming the supporting structure in double bottoms or within the double hull may require to be made of equivalent materials depending on the maximum stress levels in way.

~~*7.1.5*~~ *7.1.6* Scallops in stiffeners may not be fitted in way of end connections, crossings with primary members and tripping brackets.

Existing paragraph 7.1.6 *is to be renumbered to* 7.1.7.

7.2 Stainless steel

7.2.2 The thickness of plating forming boundaries of cargo tanks is to be in accordance with the requirements given in ~~Table 6.3.1 and~~ 7.1 ~~as applicable~~. ~~The~~ For stainless steel the plate thickness factor, K_c, depends on the position of the material, relative to the designation of the adjacent space. *See* Table 6.7.2.

■ *Section 10*
Bunkermasts

10.3 Additional requirements

10.3.2 Underdeck or enclosed spaces in which the swivel is located are not to be permanently open to cofferdams or double bottom spaces and are to be accessible for inspection purposes under all service conditions. The dimension of the access opening is to comply with Ch 4,3.2.6. This opening is to be ~~capable of being~~ closed by a removable manhole cover or hatch provided with adequate sealing arrangements.

Part 4, Chapter 7
Water Tankers, Wine Tankers and Edible Oil Tankers

Effective date 1 November 2010

■ *Section 1*
General

1.1 Application

1.1.2 Fresh water, wine, edible and vegetable oils are generally transported in a Type N open tanker having integrated (~~ADNR~~ ADN Type 2) cargo tanks as shown in Fig. 4.1.2 in Chapter 4. If carriage of the commodities in tanks independent or semi-independent from the ship's structure is required for special reasons (e.g. heating of cargo, stringent requirements for product purity, etc.), a Type N open tanker is required with tanks generally of ~~ADNR~~ ADN Type 1 or 3 as shown in Fig. 4.1.2 in Chapter 4.

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